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(54) A process for manufacturing a wax impregnated cloth material

(57) A cloth web (3) is led via feed rollers (4) one of which (4a) is movable for controlling tension, and around a de-creasing roller (5) and through a bath (10) of liquid wax. The web (3) is then led upwardly through nip rollers (15) to a remote first cooling roller (20). As the web (3) travels to the first cooling roller (20), a fan (21) directs a cooling air stream (22) along an upper face of the web (3). The web (3) is further cooled around the first cooling roller (20) and further cooling rollers (21, 22), all of the cooling rollers (20, 21, 22) being cooled by circulating a refrigerant therethrough. The cooled web (3) is then wound up at a reeling station (25).

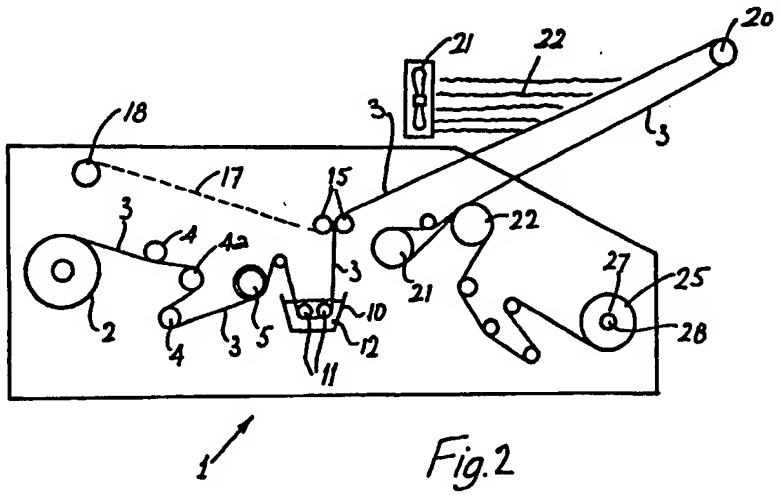

Fig.2

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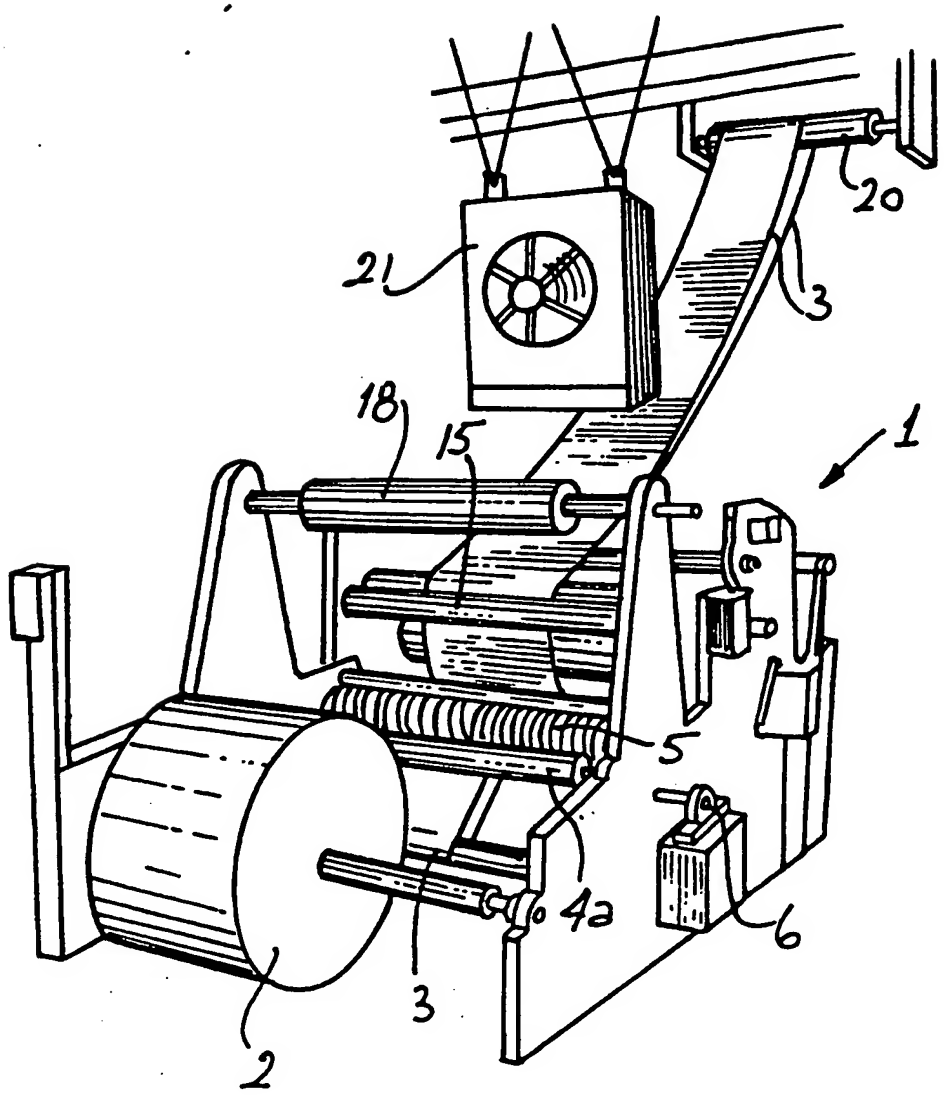

Fig. 1

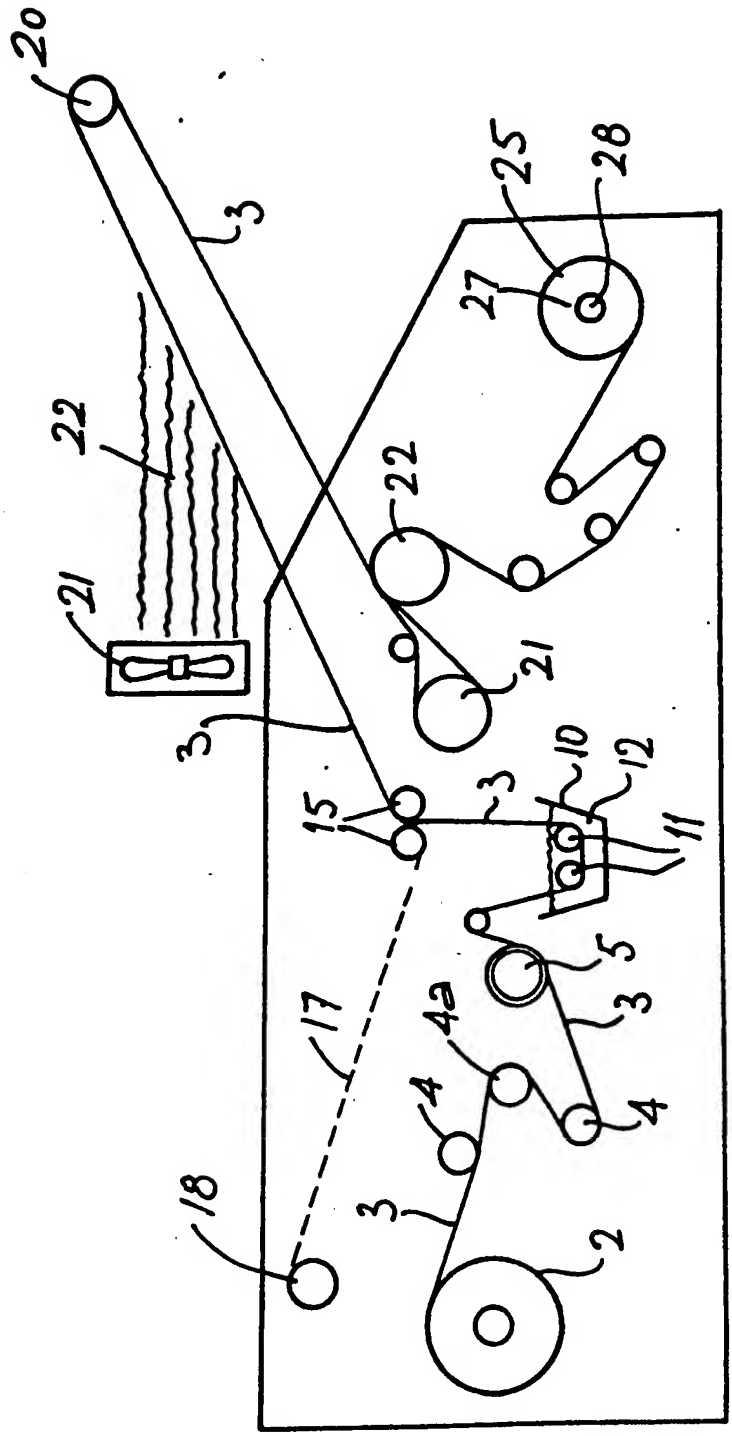

Fig. 2

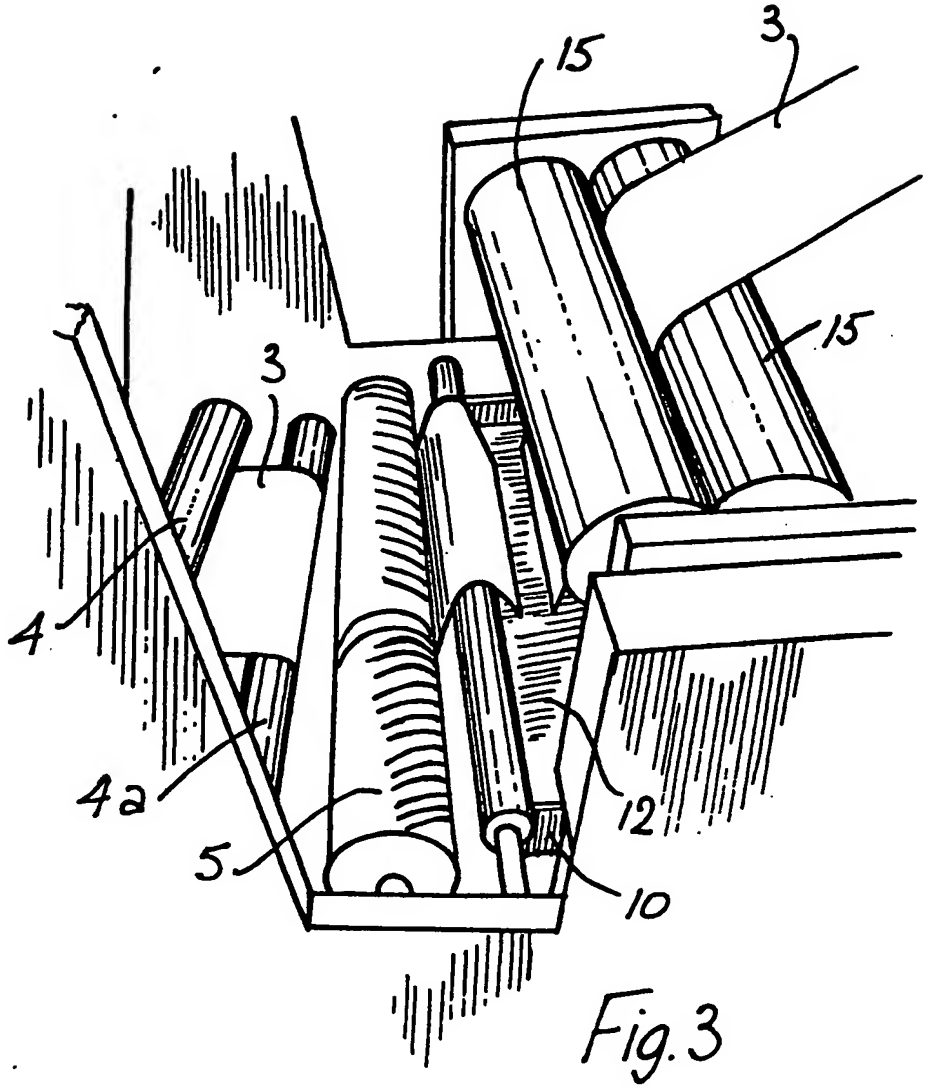

Fig.3

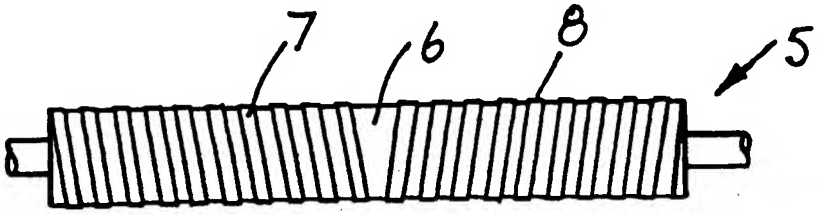

Fig.4

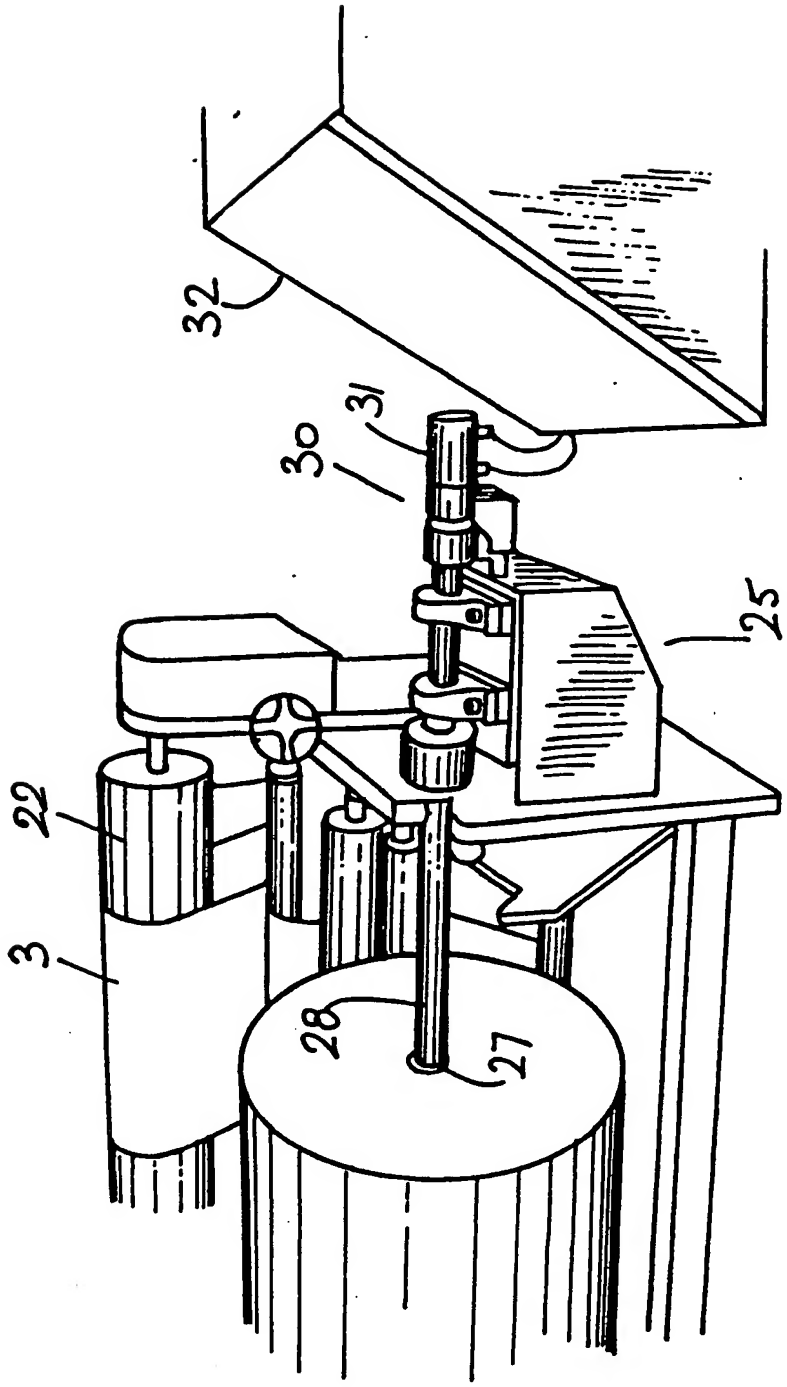

Fig. 5

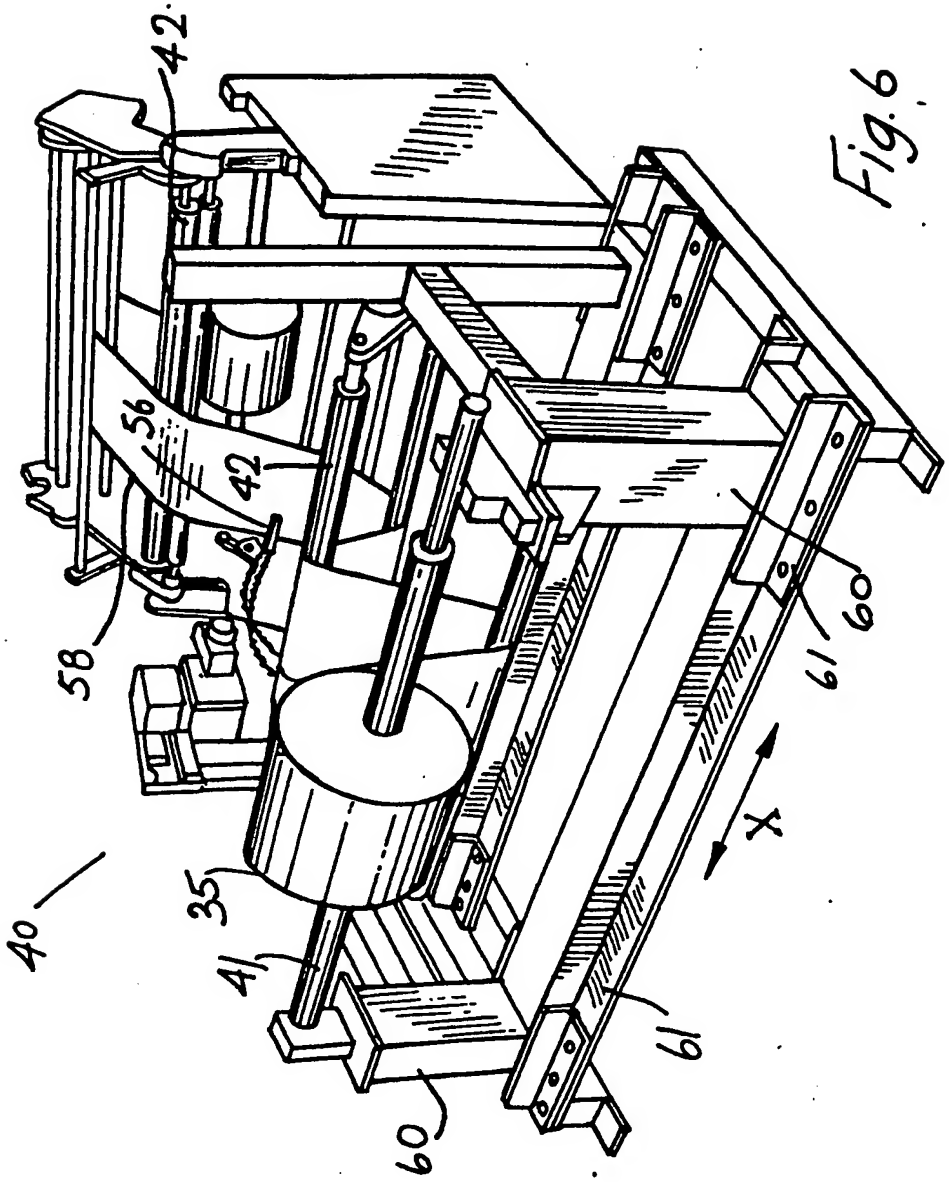

Fig. 6

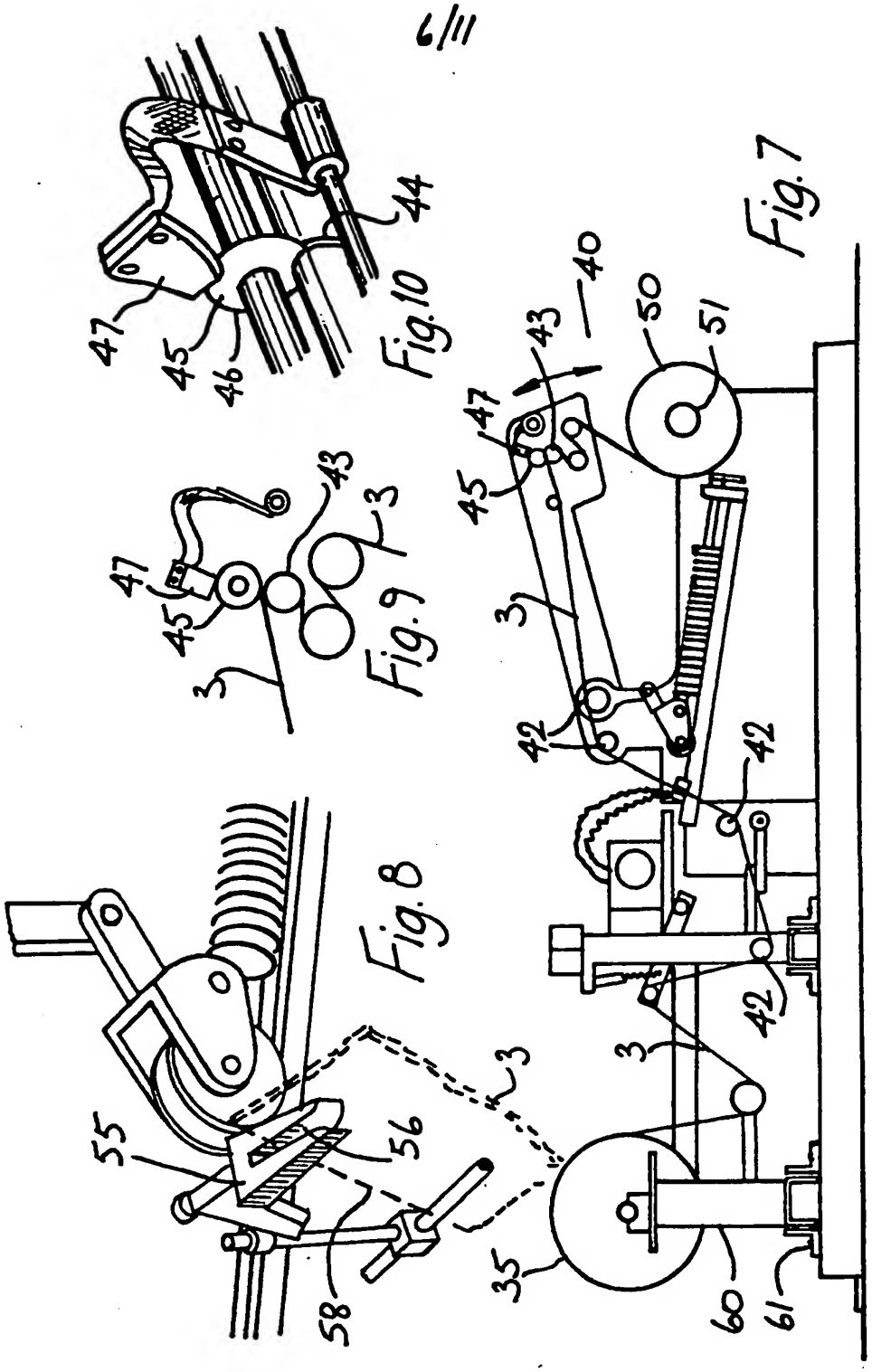

Fig. 10

Fig. 9

Fig. 8

Fig. 7

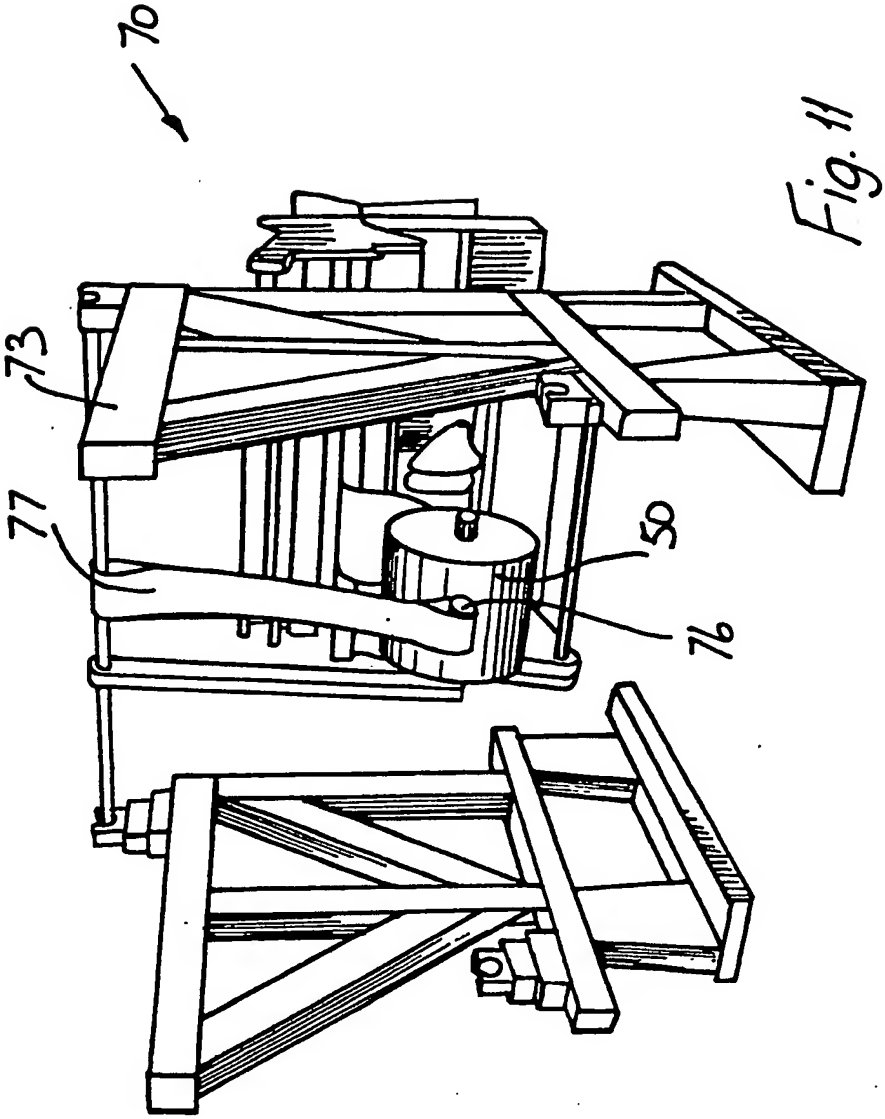

Fig. 11

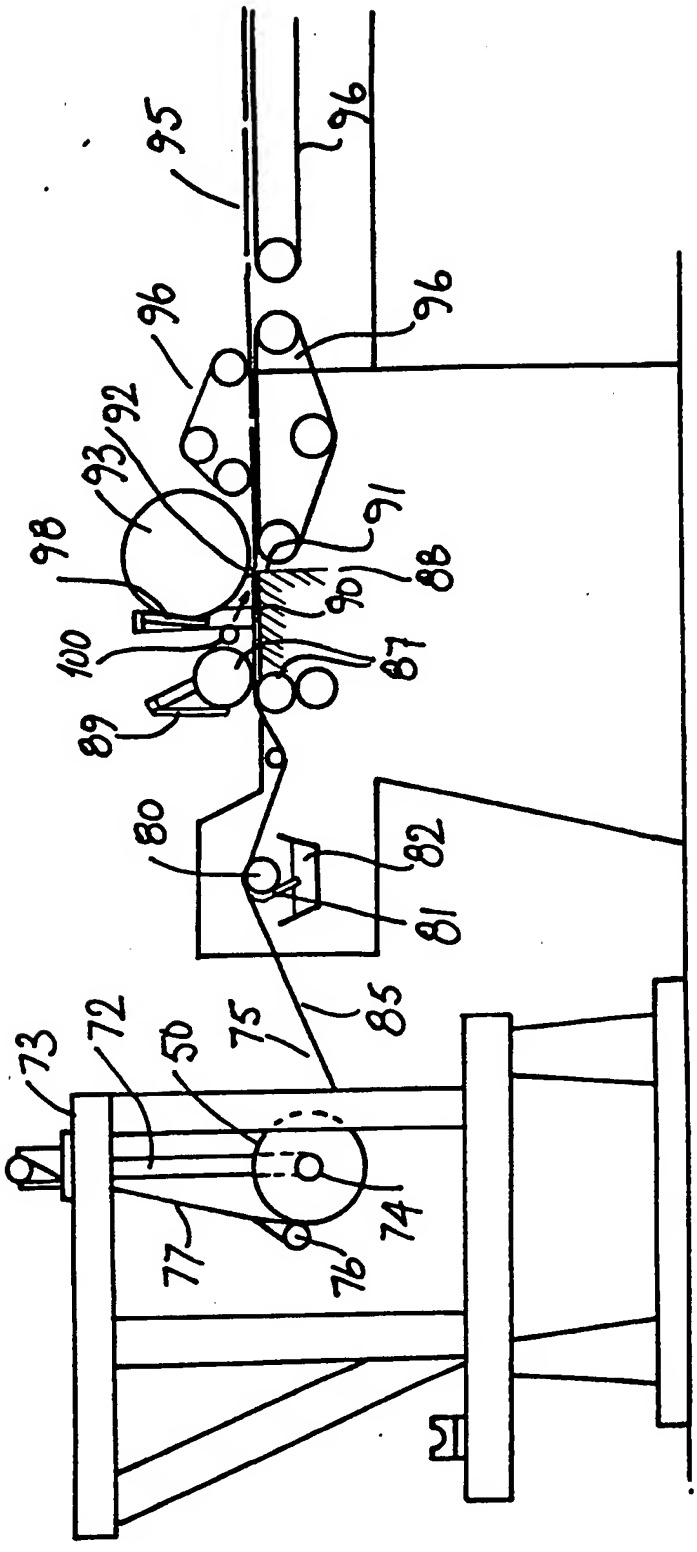

Fig. 12

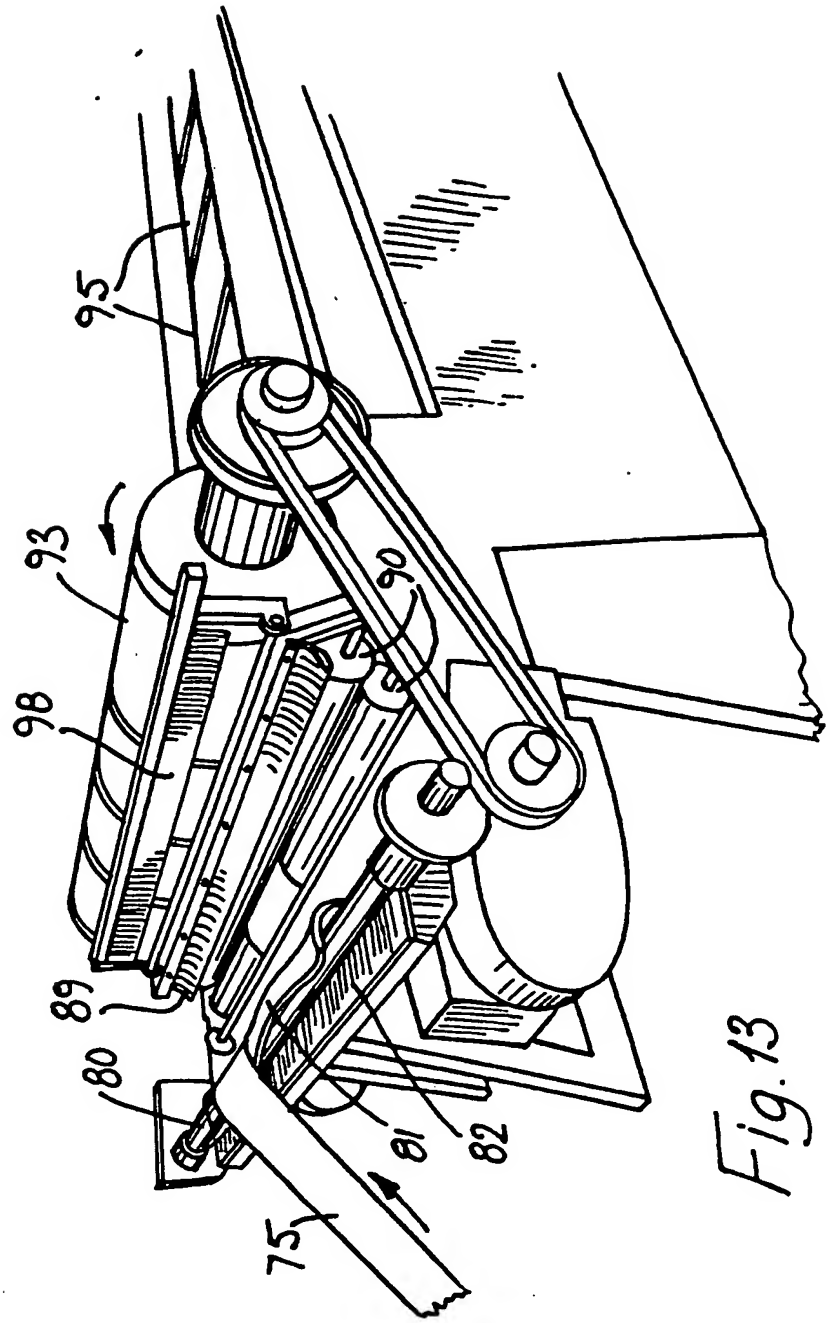

Fig. 13

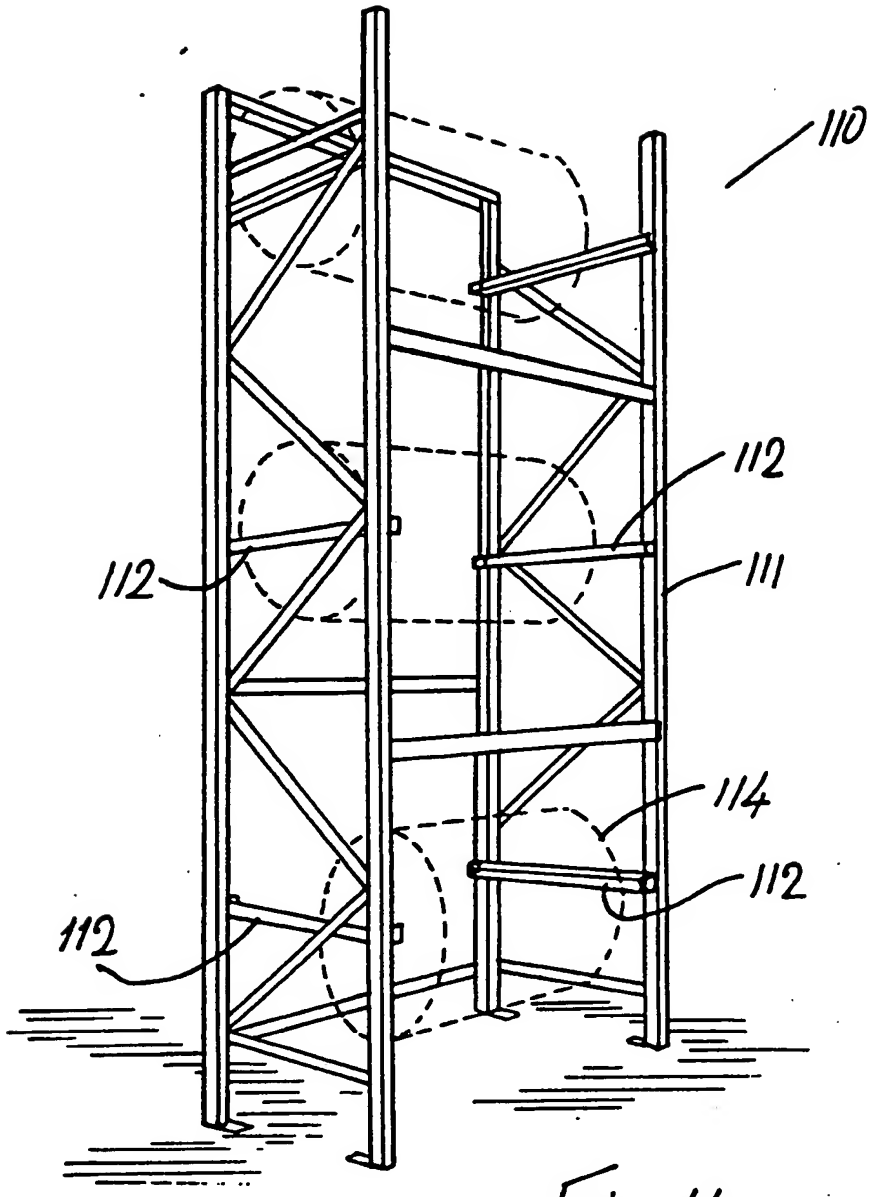

Fig. 14

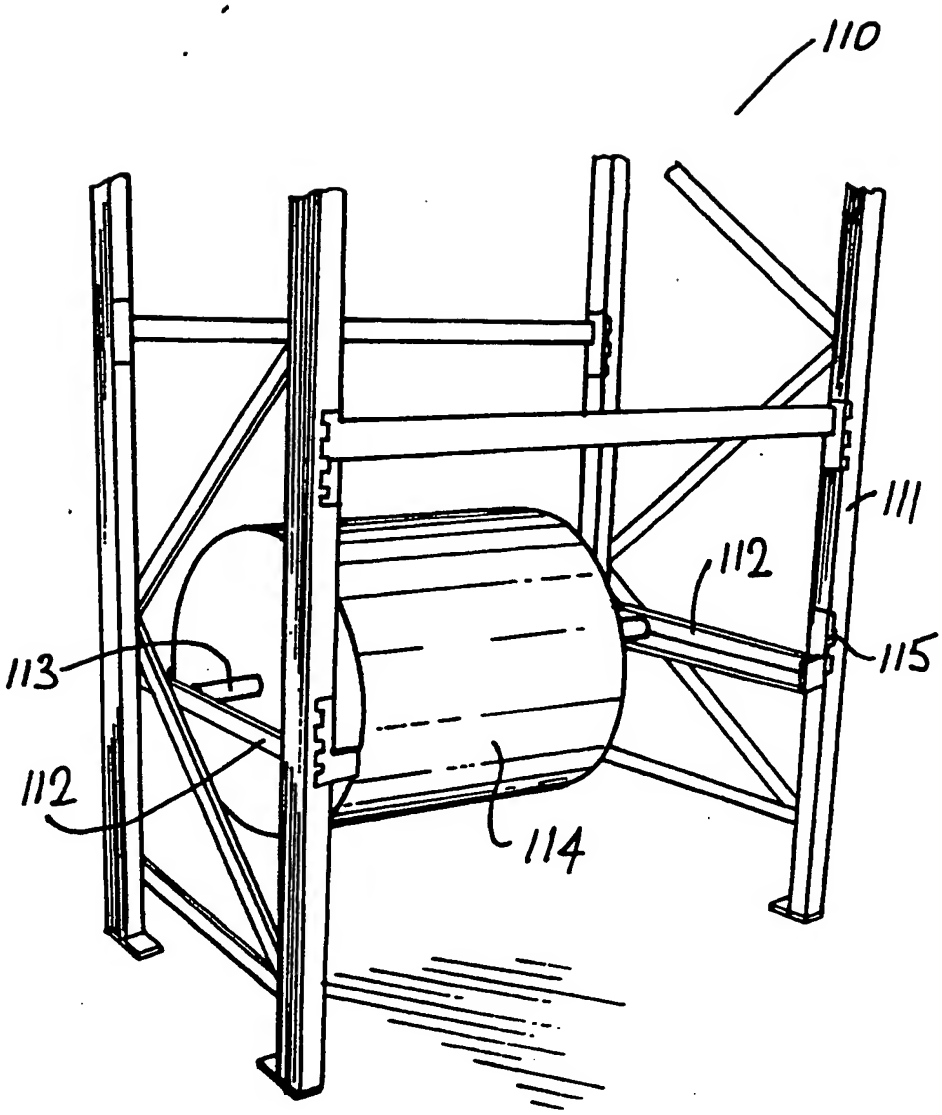

Fig. 15

"A process for manufacturing a wax impregnated cloth material"

This invention relates to a process for manufacturing a wax impregnated cloth material, in particular for the production of protective patches for shrinkable bags, such as are used for packaging meat.

Due to the nature of wax which tends to be somewhat tacky, difficulties arise in particular with regard to the handling of waxed webs during their production, the web tending to stick to machine parts and fouling the machinery with consequent process interruption and time loss due to machinery down-time and maintenance.

The present invention is directed towards overcoming these problems, and to provide a process for manufacturing a wax impregnated cloth material which is efficient and trouble-free in operation.

According to the invention there is provided a process for manufacturing a wax impregnated cloth material, comprising the steps:

leading a cloth web from a web supply reel;

applying a desired tension to the web and maintaining said desired tension by passing the web around a tensioning roller which is movable for controlling said tension within preset desirable limits;

delivering the web to a web de-creasing station, passing the web around a de-creasing roller at the de-creasing station for stretching the web transversely, the de-creasing roller having two sets of surface mounted spiral formations extending

outwardly in opposite directions from a centre of the roller for engaging and stretching the web;

impregnating the web with wax by passing the web through a wax bath containing liquid wax downstream of the de-creasing station;

leading the web upwardly from the wax bath, draining excess liquid wax into the bath, to a pair of heated nip rollers, the nip rollers being spaced-apart having a preset desirable gap therebetween, passing the web between the nip rollers for controlling the quantity of wax retained on the web;

delivering the web from the nip rollers to a first web cooling roller;

cooling the web by directing a cooling air stream onto the web as it is travelling between the nip rollers and the first web cooling roller;

further cooling the web by passing the web around the first cooling roller and associated secondary cooling rollers downstream of the first cooling roller, circulating a coolant through the web cooling rollers for cooling the web; and

leading the waxed web to a reeling station for reeling the waxed web onto a spool to form a reel of waxed web material, rotating the spool by an independent drive means for reeling the waxed web whilst applying a preset desirable tension to the waxed web.

In one embodiment of the invention, the process includes the step of controlling the spool drive means to apply a

preset initial tension to the waxed web being reeled on the spool, counting the revolutions of the spool and increasing the tension applied to the web incrementally in response to the counted spool revolutions.

In another embodiment the process further includes the step of leading a plastics backing film from a supply roll to an inlet of the nip rollers, passing the plastics film between the nip rollers with the waxed web for adhering the plastics film to one side of the web.

In a further embodiment the process includes the steps:

delivering the reel to a web cutting station;

leading the web from the reel over a number of guide rollers to a cutting roller, the cutting roller having one or more circumferential grooves intermediate its ends, each groove engageable by an associated rotary cutter blade, means being provided for lubricating a cutting edge of each cutter blade, cutting the web longitudinally at the cutting roller for dividing the web into two or more narrower webs and reeling said narrower webs. Preferably the process includes sensing the position of one edge of the web upstream of the cutting roller for determining alignment of said edge relative to the cutting roller, and laterally moving the web upstream of the cutting roller for maintaining said edge in alignment with the cutting roller.

In a preferred embodiment the process includes the steps of:

delivering a waxed reel to a sheeting station;

mounting the waxed reel on a rotatable reel support at an inlet of the sheeting station;

leading the web over a lubricating roller, the lubricating roller having a lubricating pad mounted on an outer surface of the lubricating roller and extending outwardly therefrom, dipping the lubricating pad in an associated oil bath beneath the lubricating roller as the lubricating roller rotates, the lubricating pad engaging an underside of the waxed web as it passes over the lubricating roller to deposit lubricating oil to an underside of the web, delivering the web to a cutter, the cutter having a fixed cutter blade and an associated movable cutter blade mounted on an outer surface of a rotatable drum, passing the web between the cutter blades to cut the web into a number of sheets of a preset desirable length, counting and stacking the sheets and packaging the sheets.

In another embodiment the process includes the steps of delivering the web to the fixed cutter blade along a feed table and directing an air jet from above the web downwardly towards the feed table for floating the web on an air cushion as it is being fed to the cutter blades.

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of waxing apparatus for impregnating a cloth web with wax according to a process of the invention;

Fig. 2 is a schematic illustration of the waxing apparatus;

Fig. 3 is a detail perspective view showing portion of the waxing apparatus;

Fig. 4 is an elevational view of a web de-creasing roller forming portion of the apparatus;

Fig. 5 is a perspective view of a reeling portion of the apparatus;

Fig. 6 is a perspective view of a web aligning and cutting apparatus used in the process;

Fig. 7 is a schematic illustration of the web aligning and cutting apparatus;

Figs. 8-10 are detail views illustrating portions of the web aligning and cutting apparatus;

Fig. 11 is a perspective end view of sheeting apparatus used in the process;

Fig. 12 is a diagrammatic side elevational view of the sheeting apparatus;

Fig. 13 is a detail perspective view of a web cutter portion of the web sheeting apparatus;

Fig. 14 is a perspective view of a web storage rack used in the process; and

Fig. 15 is a detail perspective view showing portion of the web storage rack.

Referring to the drawings, a process for producing a wax impregnated cloth material according to the invention will be described.

Fig. 1 shows apparatus for impregnating a cloth web with wax indicated generally by the reference numeral 1. A supply roll 2 of a woven cloth web 3 is rotatably mounted at an inlet of the apparatus 1. The web 3 is led from the supply roll 2 over a number of feed rollers 4 and are delivered to a de-creasing roller 5. One of the feed rollers 4a is mounted on a floating support which is pneumatically adjustable to move the roller 4a towards or away from the web 3 for adjustment of the tension applied to the web 3.

As the web 3 is led over the de-creasing roller 5, it is stretched transversely to remove creases from the web 3. The de-creasing roller 5 is shown in more detail in Fig. 4 and has a rubber surface 6 in which there are a pair of spiral formations 7, 8 extending outwardly from a central portion of the roller 5 towards each end of the roller 5 to stretch the web 3.

Downstream of the de-creasing roller 5, the web 3 is delivered through a wax bath 10. The web 3 is delivered around rollers 11 within the bath 10 beneath a surface of liquid wax 12 within the bath 10. The level of wax 12 within the bath 10 is maintained above the rollers 11, the wax 12 in the bath 10 being topped up with additional liquid wax as the liquid wax is taken up by the web 3. The web 3 is taken upwardly out of the wax bath 10 and passed between an associated pair of heated nip rollers 15, the gap between the nip rollers 15 being set to control the wax deposition on the web 3. Excess wax falls back into the bath 10.

Optionally, a plastics web 17 may be led from a supply roll 18 and passed between the nip rollers 15 with the waxed web 3 to adhere the plastic sheet to one side of the waxed web 3.

Downstream of the nip rollers 15, the web 3 is delivered to a remote first cooling roller 20. It will be noted from Fig. 2 that the web 3 is led to the cooling roller 20 along an inclined path. As the web 3 travels to the first cooling roller 20, a fan 21 directs a cooling air stream 22 up along an upper face of the web 3. The web 3 is further cooled as it passes around the first cooling roller 20 and also around further cooling rollers 21, 22, all of the cooling rollers 20, 21, 22 being cooled by circulating a refrigerant through the rollers 20, 21, 22. The cooled web is then wound up at a reeling station 25.

At the reeling station 25, the waxed web 3 is wound onto a spool 27 supported on a rotatable shaft 28. An independent drive means 30 is provided for rotation of the shaft 28. The drive means in this case comprises an hydraulic motor 31 with associated control means 32. The control means 32 can be adjusted such that the hydraulic motor 31 applies a preset desirable tension to the web as it is being wound on the spool 27. A counter (not shown) is provided for counting the revolutions of the shaft 28 and hence the spool 27, the counter being linked to the control means 32. The control means increases the tension applied to the web 3 incrementally in response to a preset counted number of spool revolutions. For example, every 150 revolutions, the tension applied to the web may be incrementally increased by controlling the hydraulic motor 31. This advantageously ensures that the web is evenly and tightly wound on the spool 27.

A reel 35 of waxed web material is delivered to a web aligning and cutting station 40. At the station 40, the reel 35 is mounted on a rotatable shaft 41 and led over a number of guide rollers 42 to a cutting roller 43. The cutting roller 43 has one or more circumferential grooves 44 (Fig. 10) engageable by an associated rotary cutter blade 45. Means is provided for lubricating a cutting edge 46 of each cutter blade 45. In this case, the means comprises an oil-soaked lubricating pad 47 supported adjacent the cutter blade 45 and resiliently engaging the cutter blade 45.

As the web 3 passes around the cutting roller 43, the cutter blades 45 cut the web 3 longitudinally for dividing the web into two or more narrower webs which are formed into reels 50 mounted on a rotatable spindle 51 downstream of the cutting roller 43.

Means is provided for sensing the position of a left-hand side of the web 3 relative to the cutting roller 43 as it is being delivered to the cutting roller 43. The means comprises a sensor 55 having a slot 56 through which the web 3 passes. Sensors within the slot 56 detect the position of the left-hand edge 58 of the web 3. The web 3 will move laterally in the slot 56 due to the fact that the web 3 may be unevenly wound in the reel 35. The shaft 41 supporting the reel 35 is mounted on a carriage 60 which is slidable on a base 61 in the direction of arrow X (Fig. 6). A pneumatic ram (not shown) is controlled by the detector 55 to move the carriage 60 for laterally moving the web 3 upstream of the cutting roller 43 for maintaining the left-hand edge 58 of the web 3 in alignment with a datum on a left-hand side of the cutting roller 43. Thus, the web will be evenly laid up at the left-hand end of the reels 50 and a number of webs of

preset desired width can be cut from the web 3 at the cutting roller 43.

Referring now to Figs. 11 to 13, there is illustrated a sheeting station 70. A reel 50 of waxed material is suspended on a swinging arm 72 on a support frame 73. The reel 50 is rotatably mounted on a horizontal shaft 74 on the arm 72. Tension is applied to a web 75 drawn from the reel 50 by means of a weight 76 suspended in a sling 77 and resting against an outer surface of the reel 50.

The web 75 is delivered over a lubricating roller 80. The lubricating roller 80 has a lubricating pad 81 mounted on an outer surface of the lubricating roller 80 and extending outwardly therefrom. As the roller 80 rotates, the pad 81 dips into an associated oil bath 82 from which the pad 81 picks up oil. As the lubricating roller 80 rotates, the pad 81 engages an underside 85 of the web 75 to deposit lubricating oil on the underside 85 of the web 75. It will be noted that spaced-apart strips of lubricating oil are thus applied to an underside 85 of the web 75. The web 75 is then led through guide rollers 87 to a cutting station 88. An upper guide roller 87 is engaged by a lubricating pad 89 to apply a thin film of lubricating oil to a top surface of the web 75 prior to entry to the cutting station 88.

At the cutting station 88, the web 75 is delivered along a feed table 90 and between cutting blades comprising a fixed cutting blade 91 at an outlet end of the table 90 and an associated movable cutter blade 92 mounted on an outer surface of a rotatable drum 93. As the web 75 passes between the drum 93 and table 90, the blades 91, 92 cut the web 75 into sheets 95 of a pre-desired length. The sheets 95 are discharged by conveyors 96 to a packing station.

The movable cutter blade 92 brushes against a lubricating pad 98 as it rotates. It will be appreciated that by applying lubricating oil to the web 75 and to the cutter blade 92, a clean cut is achieved through the web 75 and the web 75 does not adhere to the blades 91, 92. The strips of lubricating oil applied to an underside 85 of the web 75 align with the fixed cutter blades 91 when the movable cutter blade 92 is in register with the fixed cutting blade 91. To further facilitate feed of the web 75 through the cutting station 88, an air jet is delivered from an air supply manifold 100 mounted above the table 90 downwardly towards the feed table 90. The air jet provides an air cushion between the table 90 and an underside 85 of the web 75 as the web 75 passes over the table 90, whilst at the same time urging the web 75 downwardly towards the table 90 for a smooth controlled feed of the web 75 to the cutter blades 91, 92.

Figs. 14 and 15 show web storage racks 110 used for storing reels of cloth web material. The rack 110 has a tubular frame 111. Reel supports 112 of L-shaped section are provided at opposite sides of the frame 111 for reception and support of a spindle 113 carrying a reel 114 of cloth material. Each support 112 is height adjustable on the frame 111 having mounting brackets 115 at each end which releasably engage with associated slots in the frame members.

It will be appreciated that the invention provides a process and apparatus for manufacturing a wax impregnated cloth material in an efficient and trouble-free manner. In the production of the waxed web, the combined air and roller cooling allows a controlled and flexible cooling of the waxed web to be achieved. Further, the provision of an independent drive for the spooling of the waxed web

ensures the optimum tension can be applied to the waxed web overcoming problems associated with the web sticking to rollers where a common drive is provided for all the rollers of the waxing apparatus.

It will also be appreciated that the lubrication of the web and/or cutters, as the web is fed through the cutting apparatus and sheeting apparatus, facilitates throughput of the waxed web minimising fouling and consequent down-time.

The invention is not limited to the embodiments hereinbefore described which may be varied in both construction and detail.

CLAIMS

1. A process for manufacturing a wax impregnated cloth material, comprising the steps:

leading a cloth web from a web supply reel;

applying a desired tension to the web and maintaining said desired tension by passing the web around a tensioning roller which is movable for controlling said tension within preset desirable limits;

delivering the web to a web de-creasing station, passing the web around a de-creasing roller at the de-creasing station for stretching the web transversely, the de-creasing roller having two sets of surface mounted spiral formations extending outwardly in opposite directions from a centre of the roller for engaging and stretching the web;

impregnating the web with wax by passing the web through a wax bath containing liquid wax downstream of the de-creasing station;

leading the web upwardly from the wax bath, draining excess liquid wax into the bath, to a pair of heated nip rollers, the nip rollers being spaced-apart having a preset desirable gap therebetween, passing the web between the nip rollers for controlling the quantity of wax retained on the web;

delivering the web from the nip rollers to a first web cooling roller;

cooling the web by directing a cooling air stream onto the web as it is travelling between the nip rollers and the first web cooling roller;

further cooling the web by passing the web around the first cooling roller and associated secondary cooling rollers downstream of the first cooling roller, circulating a coolant through the web cooling rollers for cooling the web; and

leading the waxed web to a reeling station for reeling the waxed web onto a spool to form a reel of waxed web material, rotating the spool by an independent drive means for reeling the waxed web whilst applying a preset desirable tension to the waxed web.

2. A process as claimed in claim 1, further including the step of controlling the spool drive means to apply a preset initial tension to the waxed web being reeled on the spool, counting the revolutions of the spool and increasing the tension applied to the web incrementally in response to the counted spool revolutions.

3. A process as claimed in claim 1 or claim 2 further including the step of leading a plastics backing film from a supply roll to an inlet of the nip rollers, passing the plastics film between the nip rollers with the waxed web for adhering the plastics film to one side of the web.

4. A process as claimed in any preceding claim including the steps:

delivering the reel to a web cutting station;

leading the web from the reel over a number of guide rollers to a cutting roller, the cutting roller having one or more circumferential grooves intermediate its ends, each groove engageable by an associated rotary cutter blade, means being provided for lubricating a cutting edge of each cutter blade, cutting the web longitudinally at the cutting roller for dividing the web into two or more narrower webs and reeling said narrower webs.

5. A process as claimed in claim 4 including the step of sensing the position of one edge of the web upstream of the cutting roller for determining alignment of said edge relative to the cutting roller, and laterally moving the web upstream of the cutting roller for maintaining said edge in alignment with the cutting roller.

6. A process as claimed in any preceding claim including the steps of:

delivering a waxed reel to a sheeting station;

mounting the waxed reel on a rotatable reel support at an inlet of the sheeting station;

leading the web over a lubricating roller, the lubricating roller having a lubricating pad mounted on an outer surface of the lubricating roller and extending outwardly therefrom,

dipping the lubricating pad in an associated oil bath beneath the lubricating roller as the lubricating roller rotates, the lubricating pad engaging an underside of the waxed web as it passes over the lubricating roller to deposit lubricating oil to an underside of the web, delivering the web to a cutter, the cutter having a fixed cutter blade and an associated movable cutter blade mounted on an outer surface of a rotatable drum, passing the web between the cutter blades to cut the web into a number of sheets of a preset desirable length, counting and stacking the sheets and packaging the sheets.

7. A process as claimed in claim 6 including the steps of delivering the web to the fixed cutter blade along a feed table and directing an air jet from above the web downwardly towards the feed table for floating the web on an air cushion as it is being fed to the cutter blades.

8. A process substantially as hereinbefore described with reference to the accompanying drawings.

9. A web of waxed cloth material whenever produced by the process as claimed in any preceding claim.

10. Sheets of waxed cloth material whenever produced by the process as claimed in any preceding claim.

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Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9409237.6
Relevant Technical Fields (i) UK Cl (Ed.M) DIP (PDA, PDB. PDG, PDK, PDQ) (ii) Int Cl (Ed.5) D06M 23/00	Search Examiner A J RUDGE Date of completion of Search 14 JULY 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES: WPI, CLAIMS, EDOC, WP1L	Documents considered relevant following a search in respect of Claims :- ALL

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A:	Document indicating technological background and/or state of the art.	**&:**	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

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